

WHAT IS CLAIMED IS:

1. A mediator which mediates electron transfer between an enzyme and an electrode, comprising a quinone molecule derivative.

2. A mediator according to claim 1, wherein the quinone molecule derivative is a naphthoquinone molecule derivative.

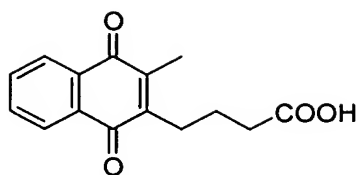
3. A mediator according to claim 2, wherein the naphthoquinone molecule derivative is one or more kinds of a naphthoquinone molecule chosen from the group consisting of a sodium anthraquinone-2-sulfonate (AQS) derivative and a 2-methyl-1,4-naphthoquinone (VK<sub>3</sub>) derivative.

4. A mediator according to claim 2, wherein the naphthoquinone molecule derivative is a 2-methyl-1,4-naphthoquinone (VK<sub>3</sub>) derivative.

5. A mediator according to claim 4, wherein the 2-methyl-1,4-naphthoquinone (VK<sub>3</sub>) derivative is 2-methyl-1,4-naphthoquinone (VK<sub>3</sub>) modified with one or more kinds of a functional group selected from the group consisting of an amino group, a carboxyl group, a chloroformyl group, a succinimide oxycarbonyl group, an alkyl metal sulfosuccinimide oxycarbonyl group, a pentafluorophenyl oxycarbonyl group, a p-nitrophenyl oxycarbonyl group, a hydroxyl group, a formyl group, a halogen group, a maleimide group, an isothiocyanate group, and an oxiranyl group.

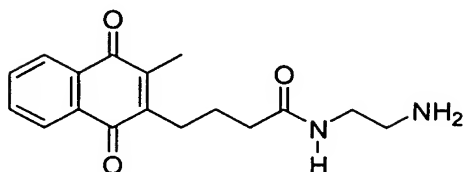
6. A mediator according to claim 5, wherein the 2-methyl-1,4-naphthoquinone (VK<sub>3</sub>) derivative is one or more kinds of a quinone molecule selected from the group consisting of 2-(3-carboxypropyl)-3-methyl-1,4-naphthoquinone (CPVK<sub>3</sub>) represented by the following formula (1), 2-{3-[N-(2-aminoethyl)aminocarbonyl]propyl}-3-methyl-1,4-naphthoquinone (AEACPVK<sub>3</sub>) represented by the following formula (2), and 2-(3-aminopropyl)-3-methyl-1,4-naphthoquinone (APVK<sub>3</sub>) represented by the following formula (3).

CPVK<sub>3</sub>



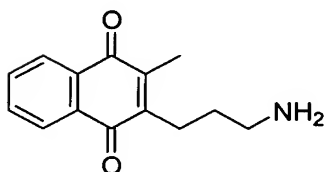
(1)

**AEACPVK<sub>3</sub>**



(2)

**APVK<sub>3</sub>**



(3)

5

7. An electrode comprising a mediator according to any one of claims 1 to 6 immobilized.

8. An electrode according to claim 7, further comprising an enzyme immobilized.

10 9. An electrode according to claim 8, wherein the enzyme contains diaphorase.

10. An electrode according to claim 8, wherein the enzyme contains diaphorase and dehydrogenase.

11. An electrode according to claim 10, wherein the dehydrogenase is glucose dehydrogenase.

15 12. An electrode according to claim 10 or 11, further comprising NADH immobilized.

13. An electrode according to claim 8 comprising the mediator and the enzyme immobilized on the electrode by a polymer and a crosslinking agent.

14. An electrode according to claim 13, wherein the polymer is polyvinylimidazole.

15. An electrode according to claim 13 or 14, wherein the crosslinking agent is polyethylene glycol diglycidyl ether (PEGDGE).

5 16. An electrode according to claim 7, further comprising an oxygen separation membrane arranged in a vicinity of the mediator.

17. An electrode according to claim 7, used for one of a biofuel cell and a biosensor.

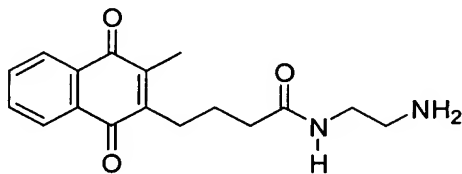
10 18. A biofuel cell including an enzyme, a substrate (fuel), and electrodes and utilizing electron transfer among the enzyme, the substrate (fuel), and the electrodes for electricity generation, comprising a cathode and an anode according to claim 7 for the electrodes.

19. A biofuel cell according to claim 18, wherein the substrate (fuel) is glucose.

15 20. A biofuel cell according to claim 18 or 19, wherein the cathode contains polydimethylsiloxane immobilized.

21. 2-{3-[N-(2-aminoethyl)aminocarbonyl]propyl}-3-methyl-1,4-naphthoquinone (AEACPVK<sub>3</sub>) represented by the following formula (2).

**AEACPVK<sub>3</sub>**



(2)